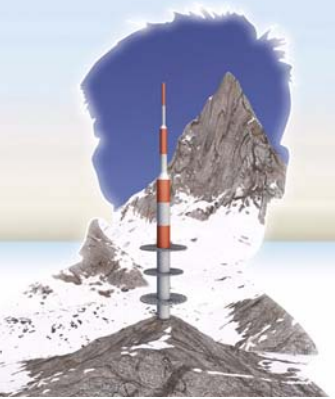
Leica Viva

Leica GS25
User Manual



Version 1.0
English

- when it has to be **right**

Leica Geosystems

Introduction

Purchase

Congratulations on the purchase of a Leica GS25 GNSS instrument.

This manual contains important safety directions as well as instructions for setting up the product and operating it. Refer to "5 Safety Directions" for further information.
Read carefully through the User Manual before you switch on the product.

Product identification

The type and serial number of your product are indicated on the type plate.
Enter the type and serial number in your manual and always refer to this information when you need to contact your agency or Leica Geosystems authorised service workshop.

Type: _____

Serial No.: _____

Symbols

The symbols used in this manual have the following meanings:

Type	Description
⚠ **DANGER**	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ **WARNING**	Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.
⚠ **CAUTION**	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury and/or appreciable material, financial and environmental damage.
☞	Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner.

Trademarks

- Windows is a registered trademark of Microsoft Corporation in the United States and other countries
- Bluetooth is a registered trademark of Bluetooth SIG, Inc.
- SD is a trademark of the SD Card Association

All other trademarks are the property of their respective owners.

Validity of this manual

This manual applies to the GS25 GNSS instrument.

Available documentation

Name	Description/Format		
GS25 Quick Guide	Provides an overview of the product together with technical data and safety directions. Intended as a quick reference guide.	✓	✓
GS25 User Manual	All instructions required in order to operate the product to a basic level are contained in the User Manual. Provides an overview of the product together with technical data and safety directions.	-	✓

Name	Description/Format		
Viva GNSS Getting Started Guide	Describes the general working of the product in standard use. Intended as a quick reference field guide.	-	✓
Viva TPS Getting Started Guide	Describes the general working of the product in standard use. Intended as a quick reference field guide.	-	✓

Name	Description/Format		
Viva Series Technical Reference Manual	Overall comprehensive guide to the product and application functions. Included are detailed descriptions of special software/hardware settings and software/hardware functions intended for technical specialists.	-	✓

Refer to the following resources for all GS25 documentation/software:

- the Leica Viva Series DVD
- https://myworld.leica-geosystems.com

myworld @Leica Geosystems

myWorld@Leica Geosystems (**https://myworld.leica-geosystems.com**) offers a wide range of services, information and training material.
With direct access to myWorld, you are able to access all relevant services whenever it is convenient for you, 24 hours a day, 7 days per week. This increases your efficiency and keeps you and your equipment instantly updated with the latest information from Leica Geosystems.

Service	Description
myProducts	Simply add all Leica Geosystems products that you and your company own. View detailed information on your products, buy additional options or Customer Care Packages (CCPs), update your products with the latest software and keep up-to-date with the latest documentation.
myService	View the service history of your products in Leica Geosystems Service Centers and detailed information on the services performed on your products. For your products that are currently in Leica Geosystems Service Centers view the current service status and the expected end date of service.
mySupport	Create new support requests for your products that will be answered by your local Leica Geosystems Support Team. View the complete history of your Support and view detailed information on each request in case you want to refer to previous support requests.
myTraining	Enhance your product knowledge with the Leica Geosystems Campus - Information, Knowledge, Training. Study the latest online training material or download training material on your products. Keep up-to-date with the latest News on your products and register for Seminars or Courses in your country.

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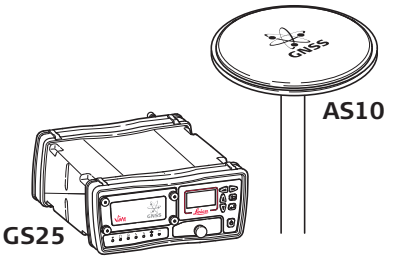
1 Description of the System

1.1 Overview

System components



1.2 System Components

Main components

Component	Description
Instrument	To calculate a position from the computed ranges to all visible GNSS (Global Navigation Satellite System) satellites.
Web server	Web-based tool to preprogram the GNSS instrument.
Antenna	To receive the satellite signals from the GNSS satellites.
LEICA Geo Office	The office software including a series of help programs which support working with Leica Viva Series instruments.

Instrument

Depending on the satellite systems and signals configured, a maximum number of 120 channels is allocated.

Instrument	Description
GS25	Up to 16 L1, 16 L2, 16 L5 channels (GPS), up to 14 L1, 14 L2 channels (GLONASS), up to 14 E1, 14 E5a, 14 E5b, 14 Alt-BOC channels (Galileo), four channels SBAS (EGNOS, WAAS, MSAS, GAGAN), code and phase, real-time capable, with event and PPS ports

Once the first operational Galileo satellites are available, a software update will be required.

The GS GNSS instruments are additionally designed to support Compass. The Compass signal definition is not fully finalised, although, test signals have been tracked in a test environment. As changes can still occur, Leica Geosystems cannot guarantee full Compass compatibility.

1.3 System Concept

1.3.1 Software Concept

Description

All instruments use the same software concept.

Software for all GS GNSS instruments

Software type	Description
GS firmware (GS_xx.fw)	This important software covers all functions of the instrument. The Web server application is integrated into the firmware and cannot be deleted. The English language is integrated into the firmware and cannot be deleted.
Language software (WEB_LANG.sxx)	Numerous languages are available for the Web server application. The English language is the default language. One language is chosen as the active language.

Software upload

Uploading GS firmware can take some time. Ensure that the battery is at least 75% full before beginning the upload, and do not remove the battery during the upload process.

Software for	Description
All GS models	The software can be uploaded using the Leica Web server application or myWorld@Leica Geosystems. Ensure that a Leica SD card is inserted into the GS instrument before starting the upload. Refer to "3.3 Working with the Memory Device".

1.3.2 Power Concept

General

Use the Leica Geosystems batteries, chargers and accessories or accessories recommended by Leica Geosystems to ensure the correct functionality of the instrument.

Power options

Power for the instrument can be supplied either internally or externally. Up to two external power supplies can be connected.

Internal power supply:	One GEB241 battery fit into the instrument.
External power supply:	GEB171 battery connected via a cable. OR Car battery connected via a converter cable supplied by Leica Geosystems. OR 10.5 V-28 V DC power supply via a converter cable supplied by Leica Geosystems. OR 110 V/240 V AC to 12 V DC power supply unit, supplied by Leica Geosystems.

For permanent operations use **U**ninterruptible **P**ower **S**upply units as a back-up in a main power failure.

1.3.3 Data Storage Concept

Description

Data (Leica GNSS raw data and RINEX data) can be recorded on the SD card.

Memory device

SD card: All GS GNSS instruments have an SD card slot fitted as standard. An SD card can be inserted and removed. Available capacity: 1 GB.

While other SD cards can be used, Leica Geosystems recommends to only use Leica SD cards and is not responsible for data loss or any other error that can occur while using a non-Leica card.

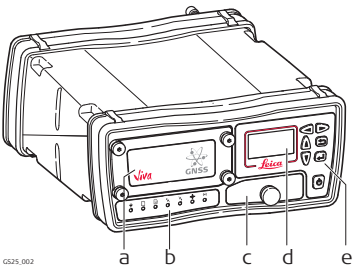
Unplugging connecting cables or removing the SD card during the measurement can cause loss of data. Only remove the SD card or unplug connecting cables when the GS GNSS instrument is switched off.

SD cards can directly be used in an OMNI drive as supplied by Leica Geosystems. Other PC card drives can require an adaptor.

1.4 Instrument Components

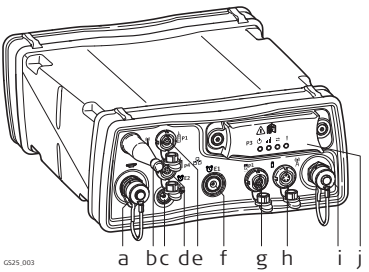
The instrument can be preprogrammed using the Web server application running from the instrument on a web browser of a Windows device. In this case, the instrument is turned on by holding down the power key for 3 s or off by holding down the power key for 3 s. A green steady light at the power LED indicates that the instrument is turned on.

GS25 components 1/2



a) Battery compartment
b) LED indicators
c) Compartment with SD card slot, USB A Host port and USB Mini port
d) Display
e) Keyboard

GS25 components 2/2



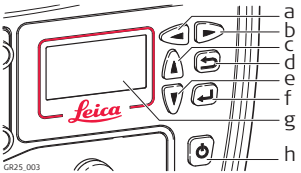
a) GNSS antenna port
b) Bluetooth antenna
c) Port PPS
d) LEMO port P4 and E2 (event input 2)
e) LEMO port P2
f) Port E1 (event input 1)
g) LEMO port P1
h) Power port
i) RTK device antenna port
j) RTK device compartment

A Bluetooth port is included inside the GS25 GNSS instrument to enable connectivity to the CS10/CS15 field controller.

2 User Interface

2.1 Keyboard

Keyboard GS25



a) Left button
b) Right button
c) Up button
d) ESC button
e) Down button
f) Enter button
g) Display
h) ON/OFF button

ON/OFF button

Key	Function
ON/OFF	If GS25 already off: Turns on GS25 when held for 3 s. While the GS25 is booting all LEDs are lighted. Once the GS25 has started, the normal LED behaviour starts.

Key	Function
	If GS25 already on: Turns off GS25 when held for 3 s. ☞ All LEDs will shine red for 1 s-2 s and then are turned off.

Arrow buttons

Button	Function
Left/Right Up/Down	To scroll through menus and configuration options. For editable fields use the arrow buttons for scrolling and selecting alphanumeric fields.

Cancel button

Button	Function
Cancel	To exit pages without storing changes.

Enter button

Button	Function
Enter	To select menu items, open new pages and select options.

2.2 Operating Principles

Operating the instrument

The GS25 GNSS instrument is operated either by pressing its keys or by the CS field controller.

Operation by keys
The GS25 GNSS instrument is operated by pressing its keys. Refer to "2.1 Keyboard" for a detailed description of the keys and their function.

Operation by CS field controller
The GS25 GNSS instrument is operated by the CS field controller using the SmartWorx Viva software. Refer to the Leica CS10/CS15 User Manual or Leica Viva GNSS Getting Started Guide for a detailed description of the keys and their function.

Turn on GS25

To turn on the instrument press and hold the power key for 3 s.

Turn off GS25

To turn off the instrument:
- press and hold the power key for 3 s
- confirm to power down the instrument when exiting SmartWorx Viva software on the CS10/CS15 field controller

2.3 Working with the User Interface

Description of the Main Menu functions

Main Menu function	Description
Status	To check the current Position, the current Tracking status and the current Power/Memory status of the GNSS instrument.
Configuration	To switch the USB device Port (Port1/Mini USB).
Tools	To format the data storage device, System RAM, Windows CE registry, to stop the USB device or to initialise the Measurement Engine (ME) of the GNSS instrument.

2.3.1 Status Functions

Description

In the Status menu you can check the current Position, the current Tracking status and the current Power/Memory status of the GS25 GNSS instrument. All fields are display only fields. Unavailable information is indicated by "--".

Access

Step	Description
1.	Turn on the GS25 GNSS instrument. Refer to "Turn on GS25".
2.	Select **Main Menu: Status** and press the Enter button to enter the **Status** menu.

Check current Position step-by-step

Step	Description
1.	Enter the **Status** menu, select **Position** and press the Enter button.
2.	Select **Base**/**Rover** and press the Enter button again.

Step	Description	
3.		The current position is displayed. Use the Left/Right button to toggle between WGS84 coordinates and Cartesian coordinates.
4.		Press the Cancel button to return to the **Position** menu.

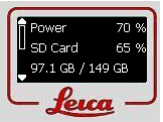
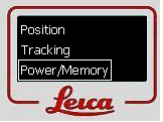
Check current Tracking step-by-step

Step	Description	
1.		Enter the **Status** menu, select **Tracking** and press the Enter button.

Step	Description
2.	The current tracking status of the satellite systems configured is displayed. Use the Up/Down buttons to toggle between the different satellite systems.
3.	Press the Cancel button to return to the **Status** menu.

Check current Power/Memory step-by-step

Step	Description
1.	Enter the **Status** menu, select **Power/Memory** and press the Enter button.

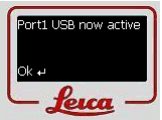
Step	Description	
2.		The current **Power/Memory** status is displayed.
3.		Press the Cancel button to return to the **Status** menu.

2.3.2 Configuration

Switch USB device port step-by-step

The USB device port can be switched between **Port1** and **Mini USB**.

Step	Description
1.	Turn on the GS25 GNSS instrument. Refer to "Operating Principles".
2.	Select **Main Menu: Configuration** and press the Enter button.
3.	Select **USB device Port** and press the Enter button.
4.	Select the USB device port you want to switch to (**Port1**/**Mini USB**) and press the Enter button.

Step	Description	
5.		The USB device port selected is activated.
6.		Press the Enter button again to return to the **Main Menu**.

2.3.3 Tools

Description

Tools Menu function	Description
Format SD card	The format the SD card of the GNSS instrument.
Format USB device	To format a USB device connected to the GNSS instrument.
Format System	To format the System RAM of the GNSS instrument. Settings of all installed software are deleted.
Format Registry	To delete registry of the GNSS instrument (resets Windows CE and communication settings to factory defaults).
Stop USB device	To stop a USB device connected to the GNSS instrument. After the USB device has been stopped, it can be safely removed from the GNSS instrument.
Initialize ME	The current almanacs stored on the GNSS instrument are deleted and new almanacs are downloaded.

Access

Step	Description
1.	Turn on the GS25 GNSS instrument. Refer to "Turn on GS25".

Step	Description
2.	Select **Main Menu: Tools** and press the Enter button.

Format SD card step-by-step

The different formatting options are similar. The individual steps do not differ between the different formatting options. As an example, the following example explains how to format an SD card.

Formatting a data storage device before storing data on it, is required if the device is new, or if all data on the device must be deleted.

By activating the format command all data will be lost. Make sure that all important data on the device has been backed up before formatting.

Step	Description
1.	Enter the **Tools** menu, select **Format SD card** and press the Enter button.

Step	Description
2.	Press the Enter button again to continue with formatting the SD card or press the Cancel button to return directly to the **Tools** menu.
3.	Once the formatting of the SD card is completed, the GS25 GNSS instrument is rebooted and you return to the **Main Menu**.

Stop USB device step-by-step

Step	Description
1.	Enter the **Tools** menu, select **Stop USB device** and press the Enter button.

Step	Description	
2.		The USB device connected to the GNSS instrument is stopped. Now you can safely remove the USB device.
3.		Press the Enter button again to return directly to the **Tools** menu.

Initialize ME step-by-step

Step	Description	
1.		Enter the **Tools** menu, select **Initialize ME** and press the Enter button.

Step	Description
2.	Press the Enter button again to continue with initialising the ME or press the Cancel button to return directly to the **Tools** menu.
3.	Once the initialising of the ME is completed, the GS25 GNSS instrument is rebooted and you return to the **Main Menu**.

3 Operation

3.1 Equipment Setup

3.1.1 Connecting to a Personal Computer

Microsoft ActiveSync (for PCs with Windows XP operating system) or Windows Mobile Device Center (for PCs with Windows Vista or Windows 7 operating system) is the synchronisation software for Windows mobile-based pocket PCs. Microsoft Active-Sync or Windows Mobile Device Center enables a PC and a Windows mobile-based pocket PC to communicate.

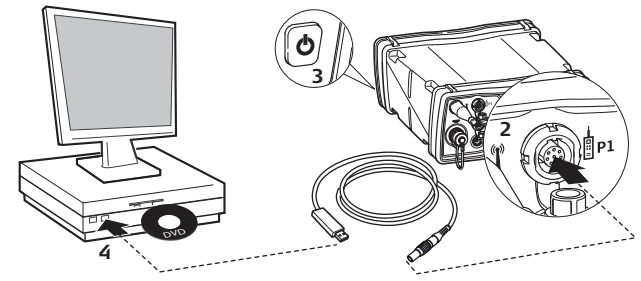
Install Leica Viva USB drivers

Step	Description
1.	Start the PC.
2.	Insert the Leica Viva Series DVD.

Step	Description
3.	Run the **SetupViva&GR_USB_XX.exe** to install the drivers necessary for Leica Viva devices. Depending on the version (32bit or 64bit) of the operating system on your PC, you have to select between the three setup files following: • SetupViva&GR_USB_32bit.exe • SetupViva&GR_USB_64bit.exe • SetupViva&GR_USB_64bit_itanium.exe ☞ The setup has to be run only once for all Leica Viva devices.
4.	The **Welcome to InstallShield Wizard for Leica Viva & GR USB drivers** window appears. ☞ Ensure that all Leica Viva devices are disconnected from your PC before you continue!
5.	**Next>**.
6.	The **Ready to Install the Program** window appears.
7.	**Install**. The drivers will be installed on your PC. ☞ For PCs with Windows Vista or Windows 7 operating system: If not already installed, Windows Mobile Device Center will be installed additionally.
8.	The **InstallShield Wizard Completed** window appears.

Step	Description
9.	Check **I have read the instructions** and click **Finish** to exit the wizard.

Connect USB cable to PC for the first time step-by-step

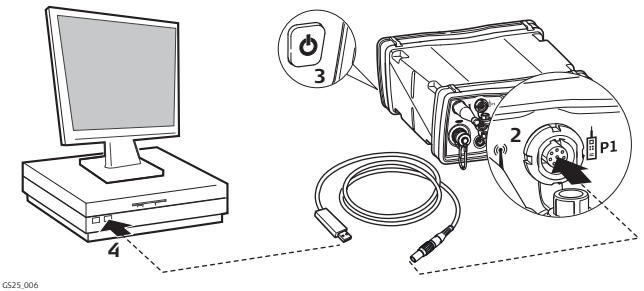


Step	Description
1.	Start the PC.
2.	Plug the GEV234 cable into Port P1 of the instrument (GS25).
3.	Turn on the instrument.

Step	Description
4.	Plug the GEV234 cable into the USB port of the PC. The **Found New Hardware Wizard** starts up automatically.
5.	Check **Yes, this time only**. **Next>**.
6.	Check **Install the software automatically (Recommended)**. **Next>**. The software for **Remote NDIS based LGS GS Device** will be installed on your PC.
7.	**Finish**.
8.	The **Found New Hardware Wizard** starts up automatically a second time.
9.	Check **Yes, this time only**. **Next>**.
10.	Check **Install the software automatically (Recommended)**. **Next>**. The software for **LGS GS USB Device** will be installed on your PC.
11.	**Finish**.
	For PCs with Windows XP operating system:
12.	Run the ActiveSync installation program if not already installed.
13.	Allow USB connections inside the **Connection Settings** window of ActiveSync.
	For PCs with Windows Vista or Windows 7 operating system:

Step	Description
14.	Windows Mobile Device Center starts up automatically. If does not start automatically, start Windows Mobile Device Center.

Connect to PC via USB cable step-by-step



Step	Description
1.	Start the PC.
2.	Plug the GEV234 cable into port P1 of the instrument.
3.	Turn on the instrument.

Step	Description
4.	Plug the GEV234 cable into the USB port of the PC.
	For PCs with Windows XP operating system:
	☞ ActiveSync starts up automatically. If does not start automatically, start ActiveSync. If not already installed, run the ActiveSync installation program.
5.	Allow USB connections inside the **Connection Settings** window of ActiveSync.
6.	Click **Explore** in ActiveSync.
	☞ The folders on the GS25 GNSS instrument are displayed under **Mobile Devices**. The folders of the data storage device can be found in **StorageCard**.
	For PCs with Windows Vista or Windows 7 operating system:
	☞ Windows Mobile Device Center starts up automatically. If does not start automatically, start Windows Mobile Device Center.

3.1.2 Connecting to the Web Server

Description

The Web server is a web-based tool to view the status of and configure the GNSS instruments. The Web server application is integrated into the GS firmware and cannot be deleted.

Accessing the Web server via cable step-by-step

Step	Description
1.	Start the PC and turn on the GS GNSS instrument. ☞ Instead of connecting to your PC, you can connect your GS GNSS instrument to the Leica CS field controller.
2.	Connect the GS GNSS instrument with the GEV234 cable to the PC. Refer to "3.1.1 Connecting to a Personal Computer".
3.	Double-Click the **Configure GS connection** shortcut from the desktop of your PC. The GS GNSS network adapter is configured with IP address: 192.168.254.1. A DOS window appears when the configuration was successful. Press any key to exit the DOS window. The **Configure GS connection** shortcut disappears from the desktop.
4.	Start the web browser of your PC.
5.	Type in **http://192.168.254.2** and press enter to access the web server of GS instrument.

Accessing the Web server via Bluetooth step-by-step

To access the Web server the tasks following have to be done:

- Configure the PC's Bluetooth device
- Establish a Bluetooth connection between PC and GS
- Accessing the Web server

Configuring the PC's Bluetooth device

Step	Description
1.	Start your PC.
2.	Activate the Bluetooth device of your PC.
3.	Go **Start⇒Settings⇒Network Connections**.
4.	Double-click **Bluetooth** from the **LAN or High-Speed Internet** device list. The **Bluetooth Properties** windows is started.
5.	In the **General** page, select **Internet Protocol (TCP/IP)** from the list and click **Properties**. The **Internet Protocol (TCP/IP) properties** windows is started.
6.	Set **IP address: 192.168.253.1** and **Subnet mask: 255.255.255.0** and click **OK** confirm the settings.
☞	This procedure has to be done only once.

Establishing a Bluetooth connection between PC and GS GNSS instrument

Step	Description
1.	Start the PC and turn on the GS GNSS instrument. ☞ Instead of connecting to your PC, you can connect your GS GNSS instrument to the Leica CS field controller. In this case, turn on the Leica CS field controller, start SmartWorx Viva and establish a Bluetooth connection to the GS GNSS instrument.
2.	Run the Bluetooth software and start the **Bluetooth Setup Wizard**.
3.	Click **Next**. The **Bluetooth Device Selection** will be started and an automatic search will be done.
4.	Select the shown GS GNSS instrument and click **Next**. The Bluetooth Security Setup is started.
5.	Type in **0000** as **Bluetooth security code** and click **Pair Now**. The pairing procedure will be done and the Bluetooth Service Selection is started.
6.	Highlight **Personal Ad-hoc Network** and check the checkbox for Personal Ad-hoc Network. ☞ Do not select **Serial Port** as service.
7.	Click **Next**. The **Bluetooth Setup Wizard Completion Page** is started.
8.	Type in a name for your GS GNSS instrument and click **Finish** to complete the **Bluetooth Setup Wizard**.

Step	Description
☞	This procedure has to be repeated for every GS GNSS instrument you want to connect to.

Accessing the Web server

Step	Description
1.	Start the web browser on your PC/CS field controller. ☞ Ensure that your GS GNSS instrument is still running and the Bluetooth connection between PC /CS field controller and GS is established.
2.	Type in **192.168.253.2**. The Web server is started. You will see the home functions following: • **Go to Work!** – To select and start the Wake-up application. • **Current Status** – To access GNSS information of the GS as well as the instrument firmware. • **Instrument** – To access configuration settings for the GS. • **User** – To upload and activate firmware, licence keys and languages.

3.2 Batteries

3.2.1 Operating Principles

Charging / first-time use

- The battery must be charged prior to using it for the first time because it is delivered with an energy content as low as possible.
- The permissible temperature range for charging is between 0°C to +40°C/ +32°F to +104°F. For optimal charging, we recommend charging the batteries at a low ambient temperature of +10°C to +20°C/+50°F to +68°F if possible.
- It is normal for the battery to become warm during charging. Using the chargers recommended by Leica Geosystems, it is not possible to charge the battery if the temperature is too high.
- For new batteries or batteries that have been stored for a long time (> three months), it is effectual to make only one charge/discharge cycle.
- For Li-Ion batteries, a single discharging and charging cycle is sufficient. We recommend carrying out the process when the battery capacity indicated on the charger or on a Leica Geosystems product deviates significantly from the actual battery capacity available.

Operation / Discharging

- The batteries can be operated from -20°C to +55°C/-4°F to +131°F.
- Low operating temperatures reduce the capacity that can be drawn; high operating temperatures reduce the service life of the battery.

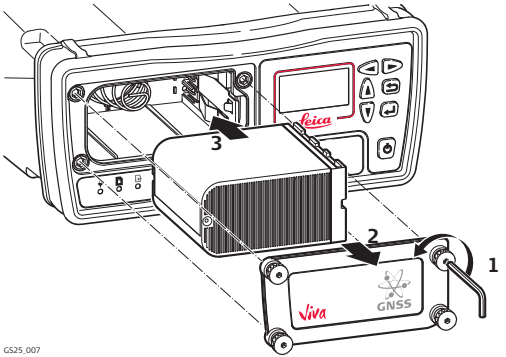
When the GS25 GNSS instrument is connected to an external power while the internal battery is inserted, the internal battery is automatically charged.

When the GS25 is turned on, the battery charging status is indicated in the GS25 Web server application.

When the GS25 is powered down, battery charging is indicated via the LEDs. Refer to "3.5 LED Indicators on GS25".

3.2.2 Battery for GS25

Change battery step-by-step



GS25_007

Step	Description
☞	The battery is inserted in the front of the instrument.
1.	Loosen the screws of the battery compartment.
2.	Open the cover of the battery compartment.

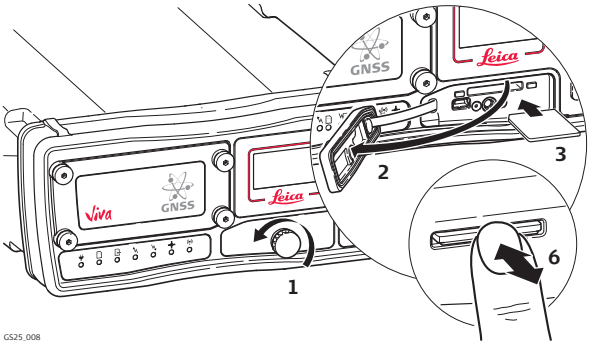
Step	Description
3.	With the Leica logo facing leftward, slide the battery into the battery compartment and push so that it locks into position.
4.	Close the cover of the battery compartment and tighten the screws.
5.	To remove the battery, loosen the screws to open the cover of the battery compartment.
6.	Push the ledge on the right side of the battery compartment to the right until it releases the battery from its fixed position.
7.	Pull out the battery.
8.	Close the cover of the battery compartment and tighten the screws.

3.3 Working with the Memory Device

- Keep the card dry.
- Use it only within the specified temperature range.
- Do not bend the card.
- Protect the card from direct impacts.

Failure to follow these instructions could result in data loss and/or permanent damage to the card.

Insert and remove an SD card into GS25 step-by-step



Step	Description
☞	The SD card is inserted in the front of the instrument.
1.	Loosen the screw on the SD card compartment.
2.	Open the cover of the SD card compartment.
3.	Insert the card firmly into the slot until it clicks into position.
4.	Close the cover of the SD card compartment and tighten the screw.
5.	To remove the card, open the cover of the SD card compartment.

Step	Description
6.	Gently press on the top of the card to release it from the slot.
7.	Remove the SD card.
8.	Close the cover of the SD card compartment and tighten the screw.

3.4 Working with the RTK Device

Devices fitting into the GS25 GNSS instrument

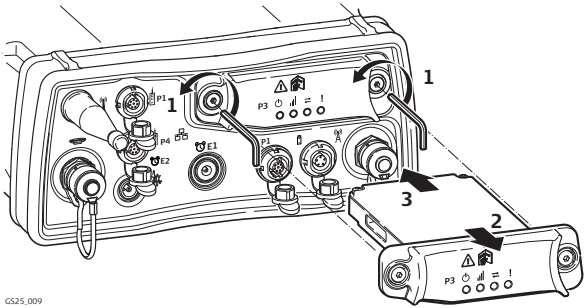
Digital cellular phones fitting into the GS25 GNSS instrument

Digital cellular phone	Device
Telit UC864-G	SLG1-2

Radios fitting into the GS25 GNSS instrument

Radio	Device
Satelline M3-TR1, transceive	SLR5-2

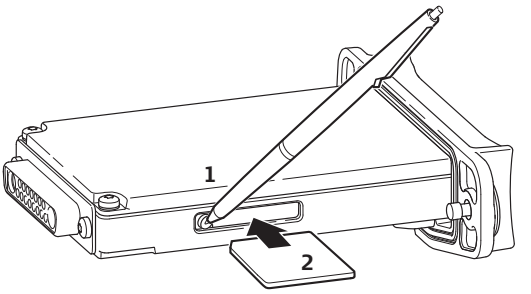
Insert and remove a slot-in-device step-by-step



Step	Description
1.	Loosen the screws of the compartment cover with the supplied Allen key.
2.	Remove the compartment cover.
3.	Attach the slot-in-device to the compartment cover.
4.	Insert the compartment cover into the compartment (port P3).
5.	Tighten the screws. All screws have to be tightened to ensure that the instrument is waterproof.

Step	Description
6.	Attach the antenna for the slot-in device to RTK device antenna port. Refer to "Port PPS".
☞	For the equipment setup as real-time base station with radio, it's recommended to use an external radio antenna mounted on a second tripod. This increases the height of the radio antenna and therefore maximises radio coverage. Refer to the Leica Viva GNSS Getting Started Guide for detailed information about the setup.

Insert and remove a SIM card step-by-step



GR10_011

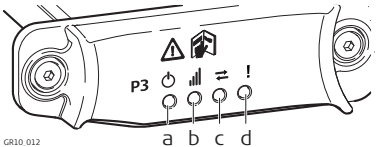
Step	Description
☞	The SIM card is inserted into a slot on the side of the SLG1-2.
☞	Take the SIM card and a pen.
1.	Using the pen, press the small button of the SIM card slot to eject the SIM card holder.
2.	Take the SIM card holder out off the SLG1-2.
3.	Place the SIM card into the SIM card holder, the chip facing up.
4.	Insert the SIM card holder into the SIM card slot, the chip facing the connectors inside the slot.

LED indicators

Description

Each slot-in-device for a radio or digital cellular phones has **L**ight **E**mitting **D**iode indicators on the bottom side. They indicate the basic device status.

Diagram



a) Power LED
b) Signal strength LED
c) Data transfer LED
d) Mode LED, available for Satelline 3AS

Description of the LEDs

IF the	on	is	THEN
Mode LED	SLR5 with Satelline M3-TR1	red	the device is in the programming mode controlled from the PC via cable.
Data transfer LED	any device	off	data is not being transferred.
		flashing green	data is being transferred.

IF the	on	is	THEN
Signal strength LED	SLG1 with Telit UC864-G	red	call is in progress.
		red: long flash, long break	no SIM card inserted, no PIN entered or network search, user authentication or network login in progress.
		red: short flash, long break	logged on to network, no call in progress.
		red: flashing red, long break	GPRS PDP context activated.
		red: long flash, short break	Packet switched data transfer is in progress.
		off	device is off.

IF the	on	is	THEN
	SLR5-2 with Satelline M3-TR1	red	the communication link, **D**ata **C**arrier **D**etection, is okay on the roving instrument.
		flashing red	the communication link, **D**ata **C**arrier **D**etection, is okay on the roving instrument, but signal is weak.
		off	the DCD is not okay.
Power LED	any device	off	power is off.
		green	power is okay.

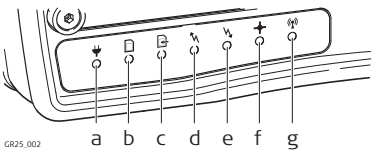
3.5 LED Indicators on GS25

LED indicators

Description

The GS25 GNSS instrument has **L**ight **E**mitting **D**iode indicators. They indicate the basic instrument status.

Diagram



a) Power LED
b) Storage LED
c) Raw data logging LED
d) RTK Base LED
e) RTK Rover LED
f) Position LED
g) Bluetooth LED

Description of the LEDs

IF the	is	THEN
Power LED	off	battery is not connected, flat or GS25 is switched off.
	green	power is 40%- 100%.

IF the	is	THEN
	yellow	power is 20%- 40%. The remaining time for which enough power is available depends on the type of survey, the temperature and the age of the battery.
	red	power is 5%- 20%.
	fast flashing red	power is low (< 5%).
Storage LED	off	no SD card is inserted or GS25 is switched off.
	green	SD card is inserted.
	flashing yellow	SD card is inserted but less than 10% memory left.
	flashing red	SD card is inserted but less than 5% memory left.
	red	SD card is inserted but full or SD card is unable to read.
Raw data logging LED	off	GS25 is not configured to log raw data.
	green	GS25 is configured to log raw data.
	flashing green	raw data is being logged.

IF the	is	THEN
	red	no raw data is being logged but GS25 is configured to log raw data.
RTK Rover LED	off	GS25 is in RTK base mode or GS25 is switched off.
	green	GS25 is in rover mode. No RTK data is being received at the interface of the communication device.
	flashing green	GS25 is in rover mode. RTK data is being received at the interface of the communication device.
RTK Base LED	off	GS25 is in RTK rover mode or GS25 is switched off.
	green	GS25 is in RTK base mode. No RTK data is being passed to the RX/TX interface of the communication device.
	flashing green	GS25 is in RTK base mode. Data is being passed to the RX/TX interface of the communication device.
Position LED	off	no satellites are tracked or GS25 is switched off.

IF the	is	THEN
	flashing yellow	less than four satellites are tracked, a position is not yet available.
	yellow	a navigated position is available.
	flashing green	a code-only position is available.
	green	a fixed RTK position is available.
Bluetooth LED	green	Bluetooth is in data mode and ready for connecting.
	purple	Bluetooth is connecting.
	blue	Bluetooth has connected.

3.6 Guidelines for Correct Results with GNSS Surveys

Undisturbed satellite signal reception	Successful GNSS surveys require undisturbed satellite signal reception, especially at the instrument which serves as a base. Set up the instrument in locations which are free of obstructions such as trees, buildings or mountains.
Steady antenna for static surveys	For static surveys, the antenna must be kept perfectly steady throughout the whole occupation of a point. Place the antenna on a tripod or pillar.
Centred and levelled antenna	Centre and level the antenna precisely over the marker.

4 Care and Transport

4.1 Transport

Transport in the field

When transporting the equipment in the field, always make sure that you
- either carry the product in its original transport container,
- or carry the tripod with its legs splayed across your shoulder, keeping the attached product upright.

Transport in a road vehicle

Never carry the product loose in a road vehicle, as it can be affected by shock and vibration. Always carry the product in its transport container and secure it.

Shipping

When transporting the product by rail, air or sea, always use the complete original Leica Geosystems packaging, transport container and cardboard box, or its equivalent, to protect against shock and vibration.

Shipping, transport of batteries

When transporting or shipping batteries, the person in charge of the product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping, contact your local passenger or freight transport company.

4.2 Storage

Product

Respect the temperature limits when storing the equipment, particularly in summer if the equipment is inside a vehicle. Refer to "6 Technical Data" for information about temperature limits.

Li-Ion batteries

- Refer to "6 Technical Data" for information about storage temperature range.
- At the recommended storage temperature range, batteries containing a 10% to 50% charge can be stored for up to one year. After this storage period the batteries must be recharged.
- Remove batteries from the product and the charger before storing.
- After storage recharge batteries before using.
- Protect batteries from damp and wetness. Wet or damp batteries must be dried before storing or use.
- A storage temperature range of -20°C to +30°C/-4°F to 86°F in a dry environment is recommended to minimise self-discharging of the battery.

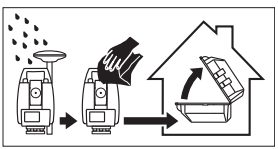
4.3 Cleaning and Drying

Product and accessories

- Use only a clean, soft, lint-free cloth for cleaning. If necessary, moisten the cloth with water or pure alcohol. Do not use other liquids; these may attack the polymer components.

Damp products

Dry the product, the transport container, the foam inserts and the accessories at a temperature not greater than 40°C/104°F and clean them. Do not repack until everything is dry. Always close the transport container when using in the field.



Cables and plugs

Keep plugs clean and dry. Blow away any dirt lodged in the plugs of the connecting cables.

Connectors with dust caps

Wet connectors must be dry before attaching the dust cap.

5 Safety Directions

5.1 General Introduction

Description

The following directions enable the person responsible for the product, and the person who actually uses the equipment, to anticipate and avoid operational hazards.

The person responsible for the product must ensure that all users understand these directions and adhere to them.

5.2 Intended Use

Permitted use

- Computing with software.
- Carrying out measurement tasks using various GNSS measuring techniques.
- Recording GNSS and point related data.
- Data communication with external appliances.
- Measuring raw data and computing coordinates using carrier phase and code signal from GNSS satellites.

Adverse use

- Use of the product without instruction.
- Use outside of the intended limits.
- Disabling safety systems.
- Removal of hazard notices.
- Opening the product using tools, for example screwdriver, unless this is permitted for certain functions.
- Modification or conversion of the product.
- Use after misappropriation.
- Use of products with recognisable damages or defects.
- Use with accessories from other manufacturers without the prior explicit approval of Leica Geosystems.
- Inadequate safeguards at the working site, for example when measuring on roads.
- Controlling of machines, moving objects or similar monitoring application without additional control- and safety installations.

WARNING

Adverse use can lead to injury, malfunction and damage.
It is the task of the person responsible for the equipment to inform the user about hazards and how to counteract them. The product is not to be operated until the user has been instructed on how to work with it.

5.3 Limits of Use

Environment

Suitable for use in an atmosphere appropriate for permanent human habitation: not suitable for use in aggressive or explosive environments.

DANGER

Local safety authorities and safety experts must be contacted before working in hazardous areas, or close to electrical installations or similar situations by the person in charge of the product.

5.4 Responsibilities

Manufacturer of the product

Leica Geosystems AG, CH-9435 Heerbrugg, hereinafter referred to as Leica Geosystems, is responsible for supplying the product, including the user manual and original accessories, in a safe condition.

Manufacturers of non Leica Geosystems accessories

The manufacturers of non Leica Geosystems accessories for the product are responsible for developing, implementing and communicating safety concepts for their products, and are also responsible for the effectiveness of those safety concepts in combination with the Leica Geosystems product.

Person in charge of the product

The person in charge of the product has the following duties:

- To understand the safety instructions on the product and the instructions in the user manual.
- To be familiar with local regulations relating to safety and accident prevention.
- To inform Leica Geosystems immediately if the product and the application becomes unsafe.
- To ensure that the national laws, regulations and conditions for the operation of radio transmitters are respected.

WARNING The person responsible for the product must ensure that it is used in accordance with the instructions. This person is also accountable for the training and the deployment of personnel who use the product and for the safety of the equipment in use.

5.5 Hazards of Use

WARNING

The absence of instruction, or the inadequate imparting of instruction, can lead to incorrect or adverse use, and can cause accidents with far-reaching human, material, financial and environmental consequences.

Precautions:
All users must follow the safety directions given by the manufacturer and the directions of the person responsible for the product.

CAUTION

Watch out for erroneous measurement results if the product has been dropped or has been misused, modified, stored for long periods or transported.

Precautions:
Periodically carry out test measurements and perform the field adjustments indicated in the user manual, particularly after the product has been subjected to abnormal use and before and after important measurements.

DANGER

Because of the risk of electrocution, it is dangerous to use poles and extensions in the vicinity of electrical installations such as power cables or electrical railways.

Precautions:
Keep at a safe distance from electrical installations. If it is essential to work in this environment, first contact the safety authorities responsible for the electrical installations and follow their instructions.

⚠ WARNING

During dynamic applications, for example stakeout procedures there is a danger of accidents occurring if the user does not pay attention to the environmental conditions around, for example obstacles, excavations or traffic.

Precautions:
The person responsible for the product must make all users fully aware of the existing dangers.

⚠ WARNING

Inadequate securing of the working site can lead to dangerous situations, for example in traffic, on building sites, and at industrial installations.

Precautions:
Always ensure that the working site is adequately secured. Adhere to the regulations governing safety and accident prevention and road traffic.

WARNING If computers intended for use indoors are used in the field there is a danger of electric shock.

Precautions:
Adhere to the instructions given by the computer manufacturer regarding field use with Leica Geosystems products.

CAUTION If the accessories used with the product are not properly secured and the product is subjected to mechanical shock, for example blows or falling, the product may be damaged or people can sustain injury.

Precautions:
When setting-up the product, make sure that the accessories are correctly adapted, fitted, secured, and locked in position.
Avoid subjecting the product to mechanical stress.

WARNING If the product is used with accessories, for example masts, staffs, poles, you may increase the risk of being struck by lightning.

Precautions:
Do not use the product in a thunderstorm.

DANGER If the product is used with accessories, for example on masts, staffs, poles, you may increase the risk of being struck by lightning. Danger from high voltages also exists near power lines. Lightning, voltage peaks, or the touching of power lines can cause damage, injury and death.

Precautions:

- Do not use the product in a thunderstorm as you can increase the risk of being struck by lightning.
- Be sure to remain at a safe distance from electrical installations. Do not use the product directly under or close to power lines. If it is essential to work in such an environment contact the safety authorities responsible for electrical installations and follow their instructions.
- If the product has to be permanently mounted in an exposed location, it is advisable to provide a lightning conductor system. A suggestion on how to design a lightning conductor for the product is given below. Always follow the regulations in force in your country regarding grounding antennas and masts. These installations must be carried out by an authorised specialist.
- To prevent damages due to indirect lightning strikes (voltage spikes) cables, for example for antenna, power source or modem should be protected with appropriate protection elements, like a lightning arrester. These installations must be carried out by an authorised specialist.
- If there is a risk of a thunderstorm, or if the equipment is to remain unused and unattended for a long period, protect your product additionally by unplugging all systems components and disconnecting all connecting cables and supply cables, for example, instrument - antenna.

Lightning conductors

Suggestion for design of a lightning conductor for a GNSS system:

1) On non-metallic structures

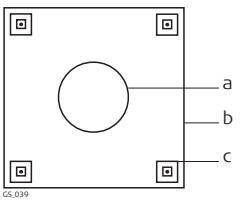
   Protection by air terminals is recommended. An air terminal is a pointed solid or tubular rod of conducting material with proper mounting and connection to a conductor. The position of four air terminals can be uniformly distributed around the antenna at a distance equal to the height of the air terminal.

   The air terminal diameter should be 12 mm for copper or 15 mm for aluminium. The height of the air terminals should be 25 cm to 50 cm. All air terminals should be connected to the down conductors. The diameter of the air terminal should be kept to a minimum to reduce GNSS signal shading.

2) On metallic structures

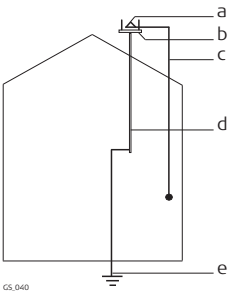
   Protection is as described for non-metallic structures, but the air terminals can be connected directly to the conducting structure without the need for down conductors.

Air terminal arrangement, plan view



a) Antenna
b) Support structure
c) Air terminal

Grounding the instrument/antenna



a) Antenna
b) Lightning conductor array
c) Antenna/instrument connection
d) Metallic mast
e) Connection to earth

WARNING Using a battery charger not recommended by Leica Geosystems can destroy the batteries. This can cause fire or explosions.

Precautions:
Only use chargers recommended by Leica Geosystems to charge the batteries.

CAUTION During the transport, shipping or disposal of batteries it is possible for inappropriate mechanical influences to constitute a fire hazard.

Precautions:
Before shipping the product or disposing of it, discharge the batteries by running the product until they are flat.
When transporting or shipping batteries, the person in charge of the product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping contact your local passenger or freight transport company.

⚠ **WARNING** High mechanical stress, high ambient temperatures or immersion into fluids can cause leakage, fire or explosions of the batteries.

Precautions:
Protect the batteries from mechanical influences and high ambient temperatures. Do not drop or immerse batteries into fluids.

⚠ **WARNING** If battery terminals come in contact with jewellery, keys, metallised paper or other metals, short circuited battery terminals can overheat and cause injury or fire, for example by storing or transporting in pockets.

Precautions:
Make sure that the battery terminals do not come into contact with metallic objects.

⚠ **WARNING** Incorrect fastening of the external antenna to vehicles or transporters poses the risk of the equipment being broken by mechanical influence, vibration or airstream. This may result in accident and physical injury.

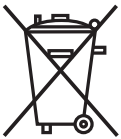
Precautions:
Attach the external antenna professionally. The external antenna must be secured additionally, for example by use of a safety cord. Ensure that the mounting device is correctly mounted and able to carry the weight of the external antenna (>1 kg) safely.

WARNING

If the product is improperly disposed of, the following can happen:

- If polymer parts are burnt, poisonous gases are produced which may impair health.
- If batteries are damaged or are heated strongly, they can explode and cause poisoning, burning, corrosion or environmental contamination.
- By disposing of the product irresponsibly you may enable unauthorised persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination.

Precautions:



The product must not be disposed with household waste.
Dispose of the product appropriately in accordance with the national regulations in force in your country.
Always prevent access to the product by unauthorised personnel.

Product-specific treatment and waste management information can be downloaded from the Leica Geosystems home page at http://www.leica-geosystems.com/treatment or received from your Leica Geosystems dealer.

WARNING

Only Leica Geosystems authorised service workshops are entitled to repair these products.

5.6 Electromagnetic Compatibility EMC

Description

The term Electromagnetic Compatibility is taken to mean the capability of the product to function smoothly in an environment where electromagnetic radiation and electrostatic discharges are present, and without causing electromagnetic disturbances to other equipment.

WARNING

Electromagnetic radiation can cause disturbances in other equipment.

Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment may be disturbed.

CAUTION

There is a risk that disturbances may be caused in other equipment if the product is used with accessories from other manufacturers, for example field computers, personal computers, two-way radios, non-standard cables or external batteries.

Precautions:

Use only the equipment and accessories recommended by Leica Geosystems. When combined with the product, they meet the strict requirements stipulated by the guidelines and standards. When using computers and two-way radios, pay attention to the information about electromagnetic compatibility provided by the manufacturer.

CAUTION

Disturbances caused by electromagnetic radiation can result in erroneous measurements.
Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that the product may be disturbed by intense electromagnetic radiation, for example, near radio transmitters, two-way radios or diesel generators.

Precautions:
Check the plausibility of results obtained under these conditions.

WARNING

If the product is operated with connecting cables attached at only one of their two ends, for example external supply cables, interface cables, the permitted level of electromagnetic radiation may be exceeded and the correct functioning of other products may be impaired.

Precautions:
While the product is in use, connecting cables, for example product to external battery, product to computer, must be connected at both ends.

Radios or digital cellular phones

Use of product with radio or digital cellular phone devices:

WARNING

Electromagnetic fields can cause disturbances in other equipment, in installations, in medical devices, for example pacemakers or hearing aids and in aircraft. It can also affect humans and animals.

Precautions:
Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment can be disturbed or that humans or animals can be affected.

- Do not operate the product with radio or digital cellular phone devices in the vicinity of filling stations or chemical installations, or in other areas where an explosion hazard exists.
- Do not operate the product with radio or digital cellular phone devices near to medical equipment.
- Do not operate the product with radio or digital cellular phone devices in aircraft.

5.7 FCC Statement, Applicable in U.S.

The greyed paragraph below is only applicable for products without radio.

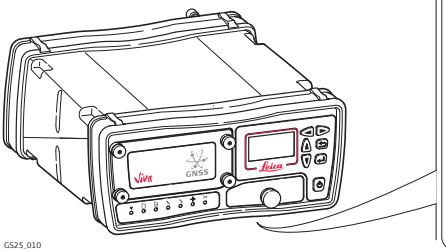
WARNING

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules.
These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING Changes or modifications not expressly approved by Leica Geosystems for compliance could void the user's authority to operate the equipment.

Labelling GS25

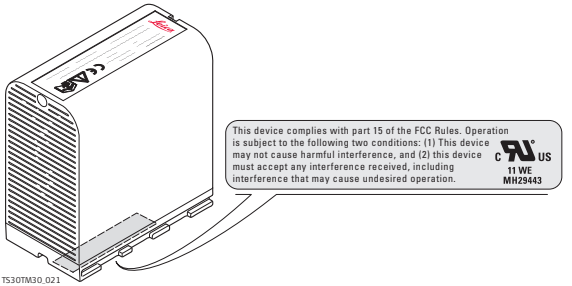


Type : GS25 S.No.: . . . . . .
Equip.No.: . . . . . Art.No.: . . . . . .
Power: 12-24V ⎓, nominal/2.5A max.
Leica Geosystems AG IC: . . . . . - . . . . . .
CH-9435 Heerbrugg Contains transmitter module:
Manufactured: 2010 FCC-ID: . . . . . .
Made in Switzerland Bluetooth QD ID: . . . . . .
. . . . . .

CE 0681

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Labelling internal battery GEB241


This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
C US
11 WE
MH29443
TS30TM30_021

6 Technical Data

6.1 GS25 Technical Data

6.1.1 Tracking Characteristics

Instrument technology	SmartTrack+	
Satellite reception	Triple frequency	
Instrument channels	GS25:	Up to 16 channels continuous tracking on L1, L2 and L5 (GPS); up to 14 channels continuous tracking on L1 and L2 (GLONASS); up to 14 channels continuous tracking on E1, E5a, E5b and Alt-BOC (Galileo); four channels tracking SBAS (EGNOS, WAAS, MSAS, GAGAN).

Depending on the satellite systems and signals configured, a maximum number of 120 channels is allocated.

Supported codes and phases

GPS

Type	L1	L2	L5
GS25	Carrier phase, C/A-code	Carrier phase, C code (L2C) and P2-code	Carrier phase, code

GLONASS

Type	L1	L2
GS25	Carrier phase, C/A-code	Carrier phase, P2-code

Galileo

Type	E1	E5a	E5b	Alt-BOC
GS25	Carrier phase, code	Carrier phase, code	Carrier phase, code	Carrier phase, code

Carrier phase and code measurements on L1, L2 and L5 (GPS) are fully independent with AS on or off.

Satellites tracked	Up to 16 simultaneously on L1, L2 and L5 (GPS) + up to 14 simultaneously on L1 and L2 (GLONASS) + up to 14 simultaneously on E1, E5a, E5b and Alt-BOC (Galileo) + up to four SBAS (EGNOS, WAAS, MSAS, GAGAN)

6.1.2 Accuracy

Accuracy is dependent upon various factors including the number of satellites tracked, constellation geometry, observation time, ephemeris accuracy, ionospheric disturbance, multipath and resolved ambiguities.

The following accuracies, given as **r**oot **m**ean **s**quare, are based on measurements processed using LGO and on real-time measurements.

The use of multiple GNSS systems can increase accuracy by up to 30% relative to GPS only.

Differential code

The baseline precision of a differential code solution for static and kinematic surveys is 25 cm.

Differential phase in post-processing

Static and rapid static

Static		**Kinematic**	
Horizontal	**Vertical**	**Horizontal**	**Vertical**
5 mm + 0.5 ppm	10 mm + 0.5 ppm	10 mm + 1 ppm	20 mm + 1 ppm

Static with long observations

Static		Kinematic	
Horizontal	**Vertical**	**Horizontal**	**Vertical**
3 mm + 0.1 ppm	3.5 mm + 0.4 ppm	10 mm + 1 ppm	20 mm + 1 ppm

Differential phase in real-time

Static		Kinematic	
Horizontal	**Vertical**	**Horizontal**	**Vertical**
5 mm + 0.5 ppm	10 mm + 0.5 ppm	10 mm + 1 ppm	20 mm + 1 ppm

6.1.3 Technical Data

Dimensions

The dimensions are given for the housing without the sockets.

Type	Length [m]	Width [m]	Thickness [m]
GS25	0.220	0.200	0.094

Weight

Instrument weights without battery and radio:

Type	Weight [kg]/[lbs]
GS25	1.84/4.06

Recording

Data (Leica GNSS raw data and RINEX data) can be recorded on the SD card.

Type	Capacity [MB]	Data capacity
SD card	• 1024	1024 MB is typically sufficient for about GPS only (12 satellites) • 8000 h L1 + L2 + L5 data logging at 15 s rate • 32000 h L1 + L2 + L5 data logging at 60 s rate • 1440000 real-time points with codes GPS + GLONASS (12/8 satellites) • 6800 h data logging at 15 s rate • 27200 h data logging at 60 s rate • 1440000 real-time points with codes GPS + GLONASS + Galileo (12/8/10 satellites) • 3200 h data logging at 15 s rate • 12800 h data logging at 60 s rate • 1440000 real-time points with codes

Power

Power consumption:	GS25, radio excluded: 3.4 W typically, 280 mA
External supply voltage:	Nominal 12 V DC (⎓, GEV71 car battery cable to a 12 V car battery), voltage range 10.5 V-28 V DC

Internal battery

Type:	Li-Ion

Voltage:	14.8 V
Capacity:	GEB241: 4.8 Ah
Typical operating time:	9 h

Battery external

Type:	NiMH
Voltage:	12 V
Capacity:	GEB171: 9.0 Ah

Operating times

The given operating times are valid for

- GS25: instrument plus antenna; fully charged GEB241 battery.
- room temperature. Operating times will be shorter when working in cold weather.

Equipment			**Operating time**
Type	**Radio**	**Digital cellular phone**	
Static	-	-	32 h continuously
Rover	SATELLINE M3-TR1, receive (SLR5-2)	-	15 h continuously
Rover	-	Telit UC864-G (SLG1-2)	14 h continuously

Electrical data

Type	GS25
Voltage	-
Current	-
Frequency	GPS L1 1575.42 MHz GPS L2 1227.60 MHz GPS L5 1176.45 MHz GLONASS L1 1602.5625 MHz-1611.5 MHz GLONASS L2 1246.4375 MHz-1254.3 MHz Galileo E1 1575.42 MHz Galileo E5a 1176.45 MHz Galileo E5b 1207.14 MHz Galileo Alt-BOC 1191.795 MHz
Gain	Typically 27 dBi
Noise Figure	Typically < 2 dBi

Galileo Alt-BOC covers bandwidth of Galileo E5a and E5b.

Environmental specifications

Temperature

Type	Operating temperature [°C]	Storage temperature [°C]
Instrument	-40 to +65	-40 to +80
Leica SD cards	-40 to +80	-40 to +80
Battery internal	-20 to +55	-40 to +70

Protection against water, dust and sand

Type	Protection
Instrument	IP67 (IEC 60529) Dust tight Waterproof to 1 m temporary immersion

Humidity

Type	Protection
Instrument	Up to 100 % The effects of condensation are to be effectively counteracted by periodically drying out the instrument.

PPS output

PPS output characteristics:

Peak:	3.3 V = High
Impedance:	50 Ω
Pulse length:	1 ms
Leading edge:	Coinciding with the beginning of each epoch.
Positive/negative edge:	Selectable

Cable connectivity:

Matched with an appropriate impedance of:	50 Ω
Socket:	LEMO ERN.OS.250.CTL

Event input

Pulse type:	TTL, positive or negative going pulse
Pulse length:	125 ns at minimum
Voltage:	TTL level, ca. 5 V, min. 3.3 V
Pin definition:	Centre = signal, Case = ground
Socket:	LEMO HGP.00.250.CTL

6.2 Antennas Technical Data

Description and use

The antenna is selected for use based upon the application. The table gives a description and the intended use of the individual antennas.

Type	Description	Use
AS05	L1 SmartTrack+ antenna with built-in ground plane.	With GS05/GS06 or GS10/GS25.
AS10	GPS, GLONASS, Galileo, Compass SmartTrack+ antenna with built-in ground plane.	With GS10/GS25.
AR10	GPS, GLONASS, Galileo, Compass antenna with large ground plane and built-in radome.	With GS10/GS25 where higher precision is required. For example static surveys of long baselines, tectonic plate monitoring and base stations.
AR25	Dorne & Margolin GPS, GLONASS, Galileo, Compass antenna element with 3D choke ring ground plane. Optional protective radome.	With GS10/GS25 where higher precision is required. For example static surveys of long baselines, tectonic plate monitoring and base stations.

Dimensions

Type	AS05/AS10	AR10	AR25
Height	6.2 cm	14.0 cm	20.0 cm
Diameter	17.0 cm	24.0 cm	38.0 cm

Connector

AS05/AS10/AR10:	TNC female
AR25:	N female

Mounting

All antennas:	5/8" Whitworth

Weight

AS05/AS10:	0.4 kg
AR10:	1.1 kg
AR25:	7.6 kg, radome 1.1 kg

Electrical data

Type	AS05	AS10	AR10	AR25
Voltage	4.5 V to 18 V DC	4.5 V to 18 V DC	3.3 V to 12 V DC	3.3 V to 12 V DC
Current	35 mA typical	35 mA typical	100 mA max	100 mA max
Frequency				

Type	AS05	AS10	AR10	AR25
GPS L1 1575.42 MHz	✓	✓	✓	✓
GPS L2 1227.60 MHz	-	✓	✓	✓
GPS L5 1176.45 MHz	-	✓	✓	✓
GLONASS L1 1602.5625- 1611.5 MHz	✓	✓	✓	✓
GLONASS L2 1246.4375- 1254.3 MHz	-	✓	✓	✓
Galileo E1 1575.42 MHz	-	✓	✓	✓
Galileo E5a 1176.45 MHz	-	✓	✓	✓
Galileo E5b 1207.14 MHz	-	✓	✓	✓

Type	AS05	AS10	AR10	AR25
Galileo Alt-BOC 1191.795 MHz	-	✓	✓	✓
Gain (typically)	27 dBi	29 dBi	29 dBi	40 dBi
Noise Figure (typically)	< 2 dBi	< 2 dBi	< 2 dBi	< 1.2 dBi max

Galileo Alt-BOC covers bandwidth of Galileo E5a and E5b.

Environmental specifications

Temperature

Type	Operating temperature [°C]	Storage temperature [°C]
AS05/AS10/AR10	-40 to +70	-55 to +85
AR25	-55 to +85	-55 to +90

Protection against water, dust and sand

Type	Protection
All antennas	IP67 (IEC 60529) Dust tight

Type	Protection
	Protected against water jets Waterproof to 1 m temporary immersion

Humidity

Type	Protection
All antennas	Up to 100 % The effects of condensation are to be effectively counteracted by periodically drying out the antenna.

Cable length

Separation distance from instrument ...	to antenna	Supplied cable lengths [m]	Optional cable lengths [m]
GS10/GS25	AS05/AS10/ AR10/AR25	1.2 2.8 10	30 50 70

6.3 Conformity to National Regulations

Conformity to national regulations

For products which do not fall under R&TTE directive:

Hereby, Leica Geosystems AG, declares that the product/s is/are in compliance with the essential requirements and other relevant provisions of the applicable European Directives. The declaration of conformity can be consulted at http://www.leica-geosystems.com/ce.

6.3.1 GS25

Conformity to national regulations

- FCC Part 15, 22 and 24 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the product GS25 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity can be consulted at http://www.leica-geosystems.com/ce.

  Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EEA member state.
- The conformity for countries with other national regulations not covered by the FCC part 15, 22 and 24 or European directive 1999/5/EC has to be approved prior to use and operation.

Frequency band

Type	Frequency band [MHz]
GS25	1176.45 1191.795 1207.14 1227.60 1246.4375 - 1254.3 1575.42 1602.4375 - 1611.5
Bluetooth	2402 - 2480

Output power

Type	Output power [mW]
GNSS	Receive only
Bluetooth	5 (Class 1)

Antenna

Type	Antenna	Gain [dBi]	Connector	Frequency band [MHz]
GNSS	External GNSS antenna element (receive only)	-	-	-

Type	Antenna	Gain [dBi]	Connector	Frequency band [MHz]
Bluetooth	Internal Microstrip antenna	1.5	-	-

6.3.2 SLR5-2, SATEL SATELLINE M3-TR1

Conformity to national regulations

- FCC Part 15 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the product SLR5-2 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity can be consulted at http://www.leica-geosystems.com/ce.

Class 2 equipment according European Directive 1999/5/EC (R&TTE) for which following EEA Member States apply restrictions on the placing on the market or on the putting into service or require authorisation for use:

- France
- Italy
- Norway (if used in the geographical area within a radius of 20km from the centre of Ny-Ålesund)

- The conformity for countries with other national regulations not covered by the FCC part 15 or European directive 1999/5/EC has to be approved prior to use and operation.

Frequency band	403 MHz - 470 MHz
Output power	SLR5-2: 0.5 W-1.0 W

Antenna

Type	GAT1	GAT2
Frequency band [MHz]	400 - 435	435 - 470
Type	Detachable λ/2 antenna	Detachable λ/2 antenna
Connector	TNC	TNC

Specific Absorption Rate (SAR)

The product meets the limits for the maximum permissible exposure of the guidelines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.

6.3.3 SLG1-2, Telit UC864-G

Conformity to national regulations

- FCC Part 15, 22 and 24 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the SLG1-2 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity may be consulted at http://www.leica-geosystems.com/ce.

Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EEA Member state.

- The conformity for countries with other national regulations not covered by the FCC part 15, 22 and 24 or European directive 1999/5/EC has to be approved prior to use and operation.

Frequency band

UMTS/HSDPA (WCDMA/FDD) 850 MHz/ 1900 MHz/ 2100 MHz
Quad-Band EGSM 850 MHz/ 900 MHz/ 1800 MHz/ 1900 MHz
GPRS multi-slot class 12
EDGE multi-slot class 12

Output power

EGSM850/900:	2 W
GSM1800/1900:	1 W
UMTS2100:	0.25 W
EDGE850/900:	0.5 W

EDGE1800/1900: 0.4 W

Antenna

Type	GAT3	GAT5	GAT18
Frequency band [MHz]	890 - 960 / 1710 - 1880 / 1920 - 2170	824 - 894 / 1850 - 1990	824 - 894 / 890 - 960 / 1710 - 1880 / 1850 - 1990 / 1920 - 2170
Type	Detachable λ/2 antenna	Detachable λ/2 antenna	Detachable λ/2 antenna
Connector	TNC	TNC	TNC

Specific Absorption Rate (SAR)

The product meets the limits for the maximum permissible exposure of the guidelines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.

7 International Limited Warranty, Software Licence Agreement

International Limited Warranty

This product is subject to the terms and conditions set out in the International Limited Warranty which you can download from the Leica Geosystems home page at http://www.leica-geosystems.com/internationalwarranty or collect from your Leica Geosystems distributor. The foregoing warranty is exclusive and is in lieu of all other warranties, terms or conditions, expressed or implied, either in fact or by operation of law, statutory or otherwise, including warranties, terms or conditions of merchantability, fitness for a particular purpose, satisfactory quality and non-infringement, all which are expressly disclaimed.

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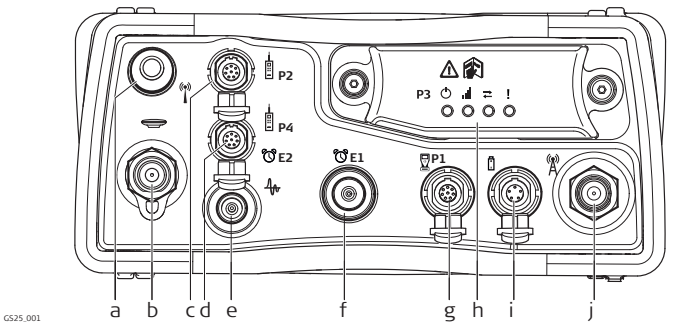
Appendix A Pin Assignments and Sockets

Description

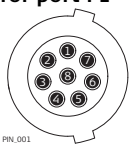
Some applications require knowledge of the pin assignments for the GS25 ports. In this chapter, the pin assignments and sockets for the ports of the GS25 are explained.

Ports at the instrument back panel



a) Port BT: Bluetooth antenna
b) Port ANT: GNSS antenna in
c) Port P2: Power out, data in/out or remote interface in/out. 8 pin LEMO
d) Port P4 and E2: Serial/Event port. 8 pin LEMO
e) Port PPS: Puls per second output
f) Port E1: Event 1
g) Port P1: CS field controller in/out or remote interface in/out. 8 pin LEMO
h) Port 3: Communication slot-in port and LEDs
i) Port PWR: Power in. 5 pin LEMO
j) Communication Slot-in port, Antenna, TNC

Pin assignments for port P1

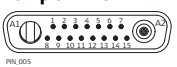


Pin	Signal Name	Function	Direction
1	USB_D+	USB data line	In or out
2	USB_D-	USB data line	In or out
3	GND	Signal ground	-
4	RxD	RS232, receive data	In
5	TxD	RS232, transmit data	Out
6	ID	Identification pin	In or out
7	PWR	Power input, 10.5 V-28 V	In
8	TRM_ON/USB_ID	RS232, general-purpose signal	In or out

Pin assignments for port P2

Pin	Signal Name	Function	Direction
1	RTS	RS232, ready to send	Out
2	CTS	RS232, clear to send	In
3	GND	Signal ground	-
4	RxD	RS232, receive data	In
5	TxD	RS232, transmit data	Out
6	ID	Identification pin	In
7	GPIO	RS232, configurable function	In or out
8	+12 V	12 V power supply out	Out

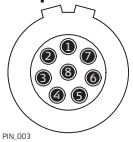
Pin assignments for port P3



Pin	Signal Name	Function	Direction
1	PWR	4 V power supply in	In
2	Tx	Transmit data	In
3	Rx	Receive data	Out
4	GPO/DCD	General-purpose out, carrier detect out	Out
5	RTS	Request to send	In

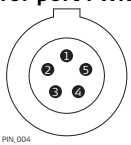
Pin	Signal Name	Function	Direction
6	CTS	Clear to send	Out
7	GPI/CFG	General-purpose in, config mode in	In
8	PWR	6 V power supply in	In
9	GPIO	General-purpose signal	In or out
10	GND	Signal and chassis ground	-
11	USB+	USB data line (+)	In or out
12	USB-	USB data line (-)	In or out
13	GND	Signal and chassis ground	-
14	ID	Identification pin	In or out
15	GPIO	General-purpose signal	In or out
A1	NC	Not used	-
A2	RF1	Antenna port, radio to antenna	-

Pin assignments for port P4/E2



Pin	Signal Name	Function	Direction
1	RTS	RS232, ready to send	Out
2	CTS	RS232, clear to send	In
3	GND	Signal ground	-
4	RxD	RS232, receive data	In
5	TxD	RS232, transmit data	Out
6	ID	Identification pin	In or out
7	GPIO/EVT2 IN	RS232, general purpose input/output	In or out
8	+12 V	12 V power supply out	Out

Pin assignments for port PWR



Pin	Signal Name	Function	Direction
1	PWR1	Power input, 11 V-28 V	In
2	ID1	Identification pin	In
3	GND	Signal ground	-
4	PWR2	Power input, 11 V-28 V	In
5	ID2	Identification pin	In

Sockets

Port P1:	LEMO-1, 8 pin, LEMO EGI.1B.308.CLN
Port P2 and P4/E2:	LEMO-1, 8 pin, LEMO HMA.1B.308.CLNP
Port 3:	15 pin RS232:RS232, 15 pin, DE15
Port PWR:	LEMO-1, 5 pin, LEMO HMG.1B.305.CLNP
PPS:	LEMO REN.OS.250.CTL
E1:	LEMO HGP.00.250.CTL

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Total Quality Management: Our commitment to total customer satisfaction.

Leica Geosystems AG, Heerbrugg, Switzerland, has been certified as being equipped with a quality system which meets the International Standards of Quality Management and Quality Systems (ISO standard 9001) and Environmental Management Systems (ISO standard 14001).

Ask your local Leica Geosystems dealer for more information about our TQM program.

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